

$$1) P(x_j | c = i) = \frac{1}{\sqrt{2\pi} \sigma_{ji}} \exp \left(- \frac{(x_j - \mu_{ji})^2}{2\sigma_{ji}^2} \right), \quad \sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

① [Bedroom feature:]

- Apartment:-

$$\mu = \frac{4+3+3+5+2+4+3}{7} = 3.4$$

$$S.D = \sqrt{\frac{0.6^2 + 0.4^2 + 1.6^2 + 1.4^2 + 0.6^2 + 0.4^2 + 0.4^2}{7-1}}$$

$$= 0.98$$

- Condo:-

$$\mu = \frac{3+3+3+5+3+3}{6} = 3.3$$

$$S.D = \sqrt{\frac{0.3^2 + 0.3^2 + 0.3^2 + 1.7^2 + 0.3^2 + 0.3^2}{6-1}}$$

$$= 0.8$$

- House:-

$$\mu = \frac{4+3+3+3+2+3+3}{7} = 3$$

$$S.D = \sqrt{\frac{1^2 + 0^2 + 0^2 + 0^2 + 1^2 + 0^2 + 0^2}{7-1}} = 0.6$$

② [Room feature:]

- Apartment:- $\mu = \frac{7+6+6+9+8+8+7}{7} = 6.9$

$$S.D = \sqrt{\frac{0.1^2 + 0.9^2 + 0.9^2 + 2.1^2 + 1.9^2 + 1.1^2 + 0.1^2}{7-1}} = 1.3$$

- Condo:- $\mu = \frac{6+6+7+10+6+6}{6} = 6.8$

$$S.D = \sqrt{\frac{0.8^2 + 0.8^2 + 0.2^2 + 3.2^2 + 0.8^2 + 0.8^2}{6-1}} = 1.6$$

House: $\mu = \frac{7+6+6+5+6+7}{7} = 6.1$

$$SD = \sqrt{\frac{0.9^2 + 0.1^2 + 0.1^2 + 0.1^2 + 1.1^2 + 0.1^2 + 0.9^2}{7-1}}$$

$$= 0.7$$

③ Bathroom feature:

	Mean	Std
Appartment	1.3	0.6
Condo	1.3	0.6
House	1.1	0.2

④ Local Price feature:

	Mean	Std
Appartment	7.3	3.7
Condo	7.4	4.6
House	5.8	0.6

⑤ Living area feature:

	Mean	Std
Appartment	1.5	0.7
Condo	1.6	0.9
House	1.4	0.2

⑥ land area feature:

	Mean	Std
Appartment	5.1	3.3
Condo	6	2.5
House	6.5	2.2

⑦ Garage feature:

	Mean	Std
Appartment	1.2	0.6
Condo	1.3	0.5
House	1.1	0.7

⑧ Age of Home Feature:

	Mean	Std
Appartment	38.6	14.7
Condo	39.5	14
House	34.4	12.6

⇒ Appartment conditional probability:-

$$P(\text{Bedroom} = 3 \mid c = \text{Apt}) = 0.37$$

$$P(\text{Room} = 6 \mid c = \text{Apt}) = 0.2$$

$$P(\text{Bathroom} = 1.5 \mid c = \text{Apt}) = 0.6$$

$$P(\text{Local price} = 6.093 \mid c = \text{Apt}) = 0.1$$

$$P(\text{Living area} = 1.65 \mid c = \text{Apt}) = 0.55$$

$$P(\text{Land area} = 6.726 \mid c = \text{Apt}) = 0.1$$

$$P(\text{Garage} = 1 \mid c = \text{Apt}) = 0.5$$

$$P(\text{Age} = 44 \mid c = \text{Apt}) = 0.03$$

$$P(\text{Bedroom} = 3 \mid c = \text{Condo}) = 0.35$$

$$P(\text{Room} = 6 \mid c = \text{Condo}) = 0.21$$

$$P(\text{Bathroom} = 1.5 \mid c = \text{Condo}) = 0.6$$

$$P(\text{Local price} = 6.093 \mid c = \text{Condo}) = 0.09$$

$$P(\text{Living area} = 1.65 \mid c = \text{Condo}) = 0.43$$

$$P(\text{Land area} = 6.726 \mid c = \text{Condo}) = 0.15$$

$$P(\text{Garage area} = 1 \mid c = \text{Condo}) = 0.16$$

$$P(\text{Age} = 44 \mid c = \text{Condo}) = 0.03$$

$$P(\text{Bedroom} = 3 \mid c = \text{home}) = 0.69$$

$$P(\text{Room} = 6 \mid c = \text{home}) = 0.56$$

$$P(\text{Bathroom} = 1.5 \mid c = \text{home}) = 0.09$$

$$P(\text{local price} = 6.093 \mid c = \text{home}) = 0.59$$

$$P(\text{living area} = 1.65 \mid c = \text{home}) = 0.89$$

$$P(\text{land area} = 6.726 \mid c = \text{home}) = 0.18$$

$$P(\text{Garage} = 1 \mid c = \text{home}) = 0.58$$

$$P(\text{Age} = 44 \mid c = \text{home}) = 0.02$$

Second example :

~~$$P(\text{Bedroom} = 4 \mid c = \text{Apt}) =$$~~

~~$$P(\text{Room} = 8 \mid c = \text{Apt}) =$$~~

	$\mid c = \text{Apt}$	$\mid c = \text{condo}$	$\mid c = \text{home}$
$P(\text{Bedroom} = 4)$	0.34	0.35	0.15
$P(\text{Room} = 8)$	0.2	0.19	0.07
$P(\text{Bathroom} = 1.5)$	0.6	0.6	0.15
$P(\text{local price} = 8.36)$	0.1	0.08	0.00002
$P(\text{living area} = 1.71)$	0.52	0.4	0.35
$P(\text{land area} = 9.5)$	0.05	0.07	0.09
$P(\text{Garage} = 2)$	0.3	0.33	0.25
$P(\text{Age} = 48)$	0.02	0.02	0.002

Third example :

	lc = Apt	lc = Conda	lc = home
P(Bedroom = 3)	0.36	0.45	0.7
P(Room = 7)	0.3	0.25	0.265
P(Bathroom = 2)	0.58	0.57	0.19
P(local price = 8.14)	0.1	0.085	0.0001
P(living area = 1.5)	0.57	0.43	1.6
P(land area = 8)	0.05	0.117	0.15
P(Garage = 2)	0.3	0.33	0.231
P(Age = 3)	0.001	0.009	0.0015

Fourth example :

	lc = Apt	lc = Conda	lc = home
P(Bedroom = 4)	0.34	0.35	0.15
P(Room = 8)	0.2	0.19	0.015
P(Bathroom = 1.5)	0.61	0.63	0.095
P(local price = 9.1416)	0.09	0.08	0.000000015
P(living area = 1.831)	0.5	0.4	0.2
P(land area = 7.3262)	0.097	0.138	0.169
P(Garage = 1.5)	0.53	0.5	0.42
P(Age = 31)	0.02	0.02	0.63

Fifth example :

	lc = Apt	lc = Conda	lc = home
P(Bedroom = 3)	0.37	0.45	0.68
P(Room = 6)	0.6	0.21	0.56
P(Bathroom = 1.5)	0.6	0.62	0.15
P(local price = 12)	0.049	0.05	$6.5 \times 10^{-29} \approx 0$
P(living area = 1.2)	0.52	0.4	1.2
P(land area = 5)	0.12	0.14	0.12
P(garage = 2)	0.3	0.32	0.23
P(Age = 30)	0.02	0.02	0.027